Report on the Strategic Partner Development Process

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EXECUTIVE SUMMARY

Two and a half years after the Telecommunications Act of 1996 passed, the promise of competition in the delivery of telecommunications services has been met only for about one percent of the population in this country. The residents and businesses in Lynchburg are not in that one percent. Lynchburg can either wait for telecommunications companies to eventually find their way to the City, or it can actively and aggressively pursue telecommunications competition, and its benefits, for the community. With its telecommunications study, and its Strategic Partner Development Process, the City has chosen not to wait for competition to arrive someday, but rather to seek solutions and provide incentives for telecommunications providers to bring their new technologies, new services, and competitive prices to the City.

The City of Lynchburg recognizes that telecommunications competition can produce many benefits for the community. Access to high speed data services is no longer a luxury, but rather a necessity, for many businesses. This is especially true in areas of the country, like Lynchburg, that are not major metropolitan hubs, or even on the interstate highway system. If Lynchburg hopes to attract new business, and keep the business it already has in the City and region, it needs to continue to do everything in its power to attract new telecommunications services that are vital to expanding businesses.

Similarly, advanced telecommunications services can significantly enhance the quality of life and educational systems in the City. Today's students need to learn how to use telecommunications technologies. They need to access information that is available over the internet. They also need to be able to take advantage of long distance learning opportunities.

Telemedicine can improve the quality of life of residents in the community by giving them access to advanced medical techniques without the need to travel to larger cities. And, of course, developing and maintaining a stable economic base enhances the quality of life, and provides better funding for education, for the whole community.

There are costs and risks associated with trying to create incentives for telecommunications competition in Lynchburg. We believe the risks are outweighed by the rewards, and that Lynchburg has a unique opportunity to fulfill its vision by actively and aggressively facilitating the development of a modern state-of-the-art telecommunications network.

All indicators suggest that Lynchburg is ready to move forward. The City's:

- history
- culture

- diversity of business, educational institutions, and medical institutions
- existing fiber optic network
- supportive and enthusiastic government, with strong leadership within the City administration; and
- community support

all demonstrate that Lynchburg is ready for competition. The hypothetical, technical, and economic models reflected in this report, and the market studies prepared by Dr. Seaman, as well as our initial feedback from major providers and developers of telecommunications systems, suggest that Lynchburg has a real possibility to succeed in bringing to its residents the promise of telecommunications competition.

We recommend that the City of Lynchburg move forward to capture this promise. The City should invite telecommunications providers to provide detailed, formal proposals outlining their strategies to help the City achieve its goals for telecommunications competition. We recommend that the invitations be finalized and circulated by October 1, 1998, with responses due no later than December 1, 1998. This will give the City the ability to choose in the first quarter of 1999 the potential partner(s) that best meet with City's needs. In the meantime, we also recommend that the City continue discussions with Bell Atlantic to determine whether the City can provide incentives to motivate Bell Atlantic to accelerate development of new services in the City.

REPORT ON THE STRATEGIC PARTNER SELECTION PROCESS

INTRODUCTION

This report presents the findings of the legal consultants engaged by the City of Lynchburg to explore development of the City owned fiber optic telecommunications network. It is accompanied by separate reports from independent technical and marketing consultants. This report is part of an ongoing effort by the City of Lynchburg to support and encourage the growth of competitive telecommunications services in Lynchburg and the surrounding region of central Virginia. It is an outgrowth of the Council's concern that effective competition in telecommunications is neither present today, nor is it likely to be present throughout the City in the near future. The lack of competition could retard the economic, educational, and cultural development of the City. Therefore, mindful of its vision for the future of the City of Lynchburg, the City is exploring options for using the fiber optic network to attract telecommunications competition.

The Lynchburg City Council Vision Statement Provides the Framework for the Strategic Partner Search.

The Vision Statement of the Lynchburg City Council has driven and framed the City's approach to its telecommunications study and its search for one or more strategic partners. The Vision Statement is so integral to these efforts, it is reproduced here in its entirety:

> *Lynchburg 2020: Working together, we will be a* ***new century community*** *shaped by new ideas and solutions, a skilled and innovative workforce, and citizen leadership - all distinguished by responsible and traditional values, involvement, education, and new technology.*
>
> *Realizing that government does not have all the answers, we will be a government that is inclusive, bringing together diverse* ***community resources*** *that enable citizens to address the priorities and challenges of the next century.*
>
> *As a City government, we will be on the* ***cutting edge of change****, providing a clear vision and the driving force to produce:*
>
> ***Stable, productive, inspired families****. We will recognize the importance of families. We will succeed by having families who are stable, well-educated, and fully employed in jobs that produce ample family income. Families in our community will be healthy, involved, responsible, and inspired by a vision for the future. As government leaders, we can encourage this vision of the family by achieving success in economic development strategies, creating a model educational system, and in building a superior community environment.*
>
> ***Strategic economic development center****. We will be a world-class economic development center. We will ensure our economic success and produce job opportunities for all by attracting research and development facilities, expanding our manufacturing base, and becoming a major player in the global market. The collective resources of the region must be harnessed to determine future trends and to develop a strong, progressive, highly technological economic base, assuring a high quality of life for our families.*
>
> ***An integrated education community****. We will be a model learning community - one that integrates all components of education to provide citizens with the skills to staff the world class economic development center. We will lead by ensuring that our educational system is the best in Virginia at teaching students such basics as reading, writing, and quantitative skills to achieve their full potential. We will facilitate the use of talents and mutual responsibility in all levels*

of education. We will encourage the family's vital role and positive involvement in education, and offer lifelong learning opportunities for all citizens.

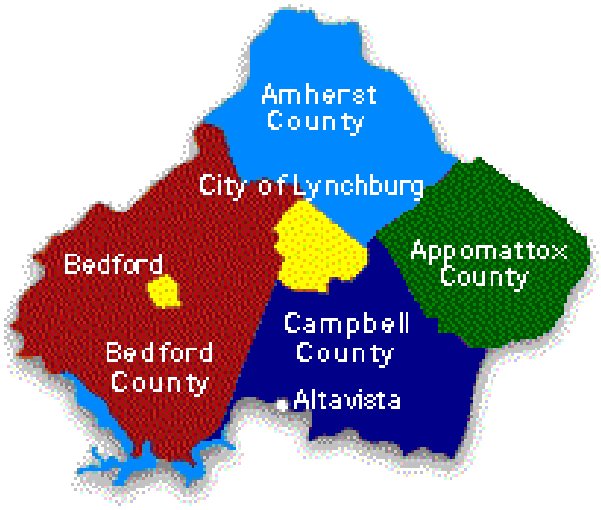
***A community environment second to none**. We will create a vibrant sense of community spirit among our citizenry. A sense of belonging and unlimited opportunity will keep and attract citizens who will play vital roles in economic growth, education, and community life. Active neighborhood involvement and citizen leadership that produces thriving, attractive, safe neighborhoods where all citizens are committed to work together to meet the challenges which will face us. As the core city of the region, Lynchburg will have well-maintained, state-of-the-art infrastructure, progressive development, and offer opportunities for the enjoyment of life - a place we can be proud to call home.*

Education . . . Stable Families . . . State-of-the-Art Infrastructure . . . A New Century Community . . . Economic Development . . . Competition.

These are the goals of the Lynchburg City Council. These goals are fundamental and inarguable. They also are realistic. This report examines how further development of the City's fiber optic network can help make the vision of the City Council a reality.

WHY LYNCHBURG?

Lynchburg Has a Lot to Offer



Lynchburg is located near the geographic center of the state in the valley of the James River, bordered by the eastern edge of the Blue Ridge Mountains. It is approximately 180 miles southwest of Washington, D.C. and 200 miles west of the port of Hampton Roads. The southern border of Virginia lies 65 miles due south.

Today, Lynchburg is home to 3,000 businesses. The wide variety of products manufactured here includes communications equipment, integrated circuits, pharmaceuticals, power generators, rubber products, and iron pipe and castings. Other major employers include insurance companies, colleges, health care facilities, and retailers. The area's highly skilled labor force numbers over 110,000, and there are many training and apprenticeship programs provided locally to enable employees to keep skills up-to-date.

Lynchburg is a broadly diversified manufacturing center known for its production of communications equipment, materials handling machinery, integrated circuits, power generators, pharmaceutical products, paperboard, rubber products, iron pipe castings, and much more. The city has one of the highest percentages of people employed in manufacturing of any city in Virginia. Over 200 manufacturers employ 30 percent of Central Virginia's work force, generating an annual payroll of approximately $665 million.

The manufacturing base is augmented by a strong and growing healthcare sector, including Centra Health with over 3000 employees, insurance companies with over 1,200 employees, and five area colleges. Nine lending institutions with assets totaling more than $230.6 billion service the area.

Increasingly, the area is solidifying its reputation as one in which "high technology" is the workplace norm. Widespread use of CAD-CAM systems by local manufacturers, the production of highly sophisticated and technical products such as communications equipment and nuclear fuel systems, and the presence of four long-haul fiber optics systems are representative of this evolving reputation. The Lynchburg City Council's vision of harnessing the collective resources of the region to "...develop a strong, progressive, highly technological economic base..." is already serving as the guide for both public and private sector activities that will insure Lynchburg's competitive position in the world of high technology.

Central Virginia Community College (CVCC) responds to the needs of local industries for highly-skilled workers by creating specific training programs, tailor-made to meet an individual firm's needs. Courses can be taught on-site or at the college. CVCC uses the latest technology available to provide instruction in electronics, computer programming, data processing, and computer-aided drafting and manufacturing. The college instituted "Quality First" and ISO 9000 programs in 1990 to support area businesses.

The Virginia Community College System and the Center for Innovative Technology have established a Technology Transfer Program to work with business leaders to provide information on available technology resources. This program is intended to channel technical knowledge of Virginia's universities to meet the needs of area businesses and to help industry make the most effective use of these resources.

Virginia's Division of Apprenticeship Training assists industry in the development of apprenticeship programs with the aim of providing an increasingly complex economy with skilled workers. The division provides technical assistance through its field staff in setting up the programs for over 80 trade classifications, working with individual employers to meet the needs of local industry. Central Virginia Community College serves as one of Virginia's regional apprenticeship centers.

Lynchburg General Hospital and Virginia Baptist Hospital are divisions of Centra Health, a community-owned, not-for-profit healthcare system created in 1986. Lynchburg General offers emergency and trauma care, cardiology, neurology, critical care, orthopedics, and neurosurgery services. Virginia Baptist offers cancer care, mental health and chemical dependency treatment, home health, and physical rehabilitation. Nearly 300 physicians, representing all major specialties, practice in the area.

But There Are Challenges

While Lynchburg has a lot to offer its residents and businesses, it faces challenges in attracting new employers and ensuring that its residents receive the benefits of all the latest advancements in telecommunications technologies, including access to high speed data services. Lynchburg is not served by the Interstate Highway System. It is approximately 60 miles from Interstate 81, which passes the west side of Roanoke, and 90 miles from Interstate 64, to the north.

Lynchburg competes with the wealthier and more heavily developed areas to the north and east, including the Washington, D.C., Richmond, and the Newport News/Norfolk areas. It also competes with the other states in the region for new business and industry.

With a population of 68,000, and 210,000 in the regional area, Lynchburg is not considered a major market. It is not likely to attract the biggest telecommunications competitors. As a matter of fact, at the current time, Bell Atlantic is the only provider of local telephone services and of high speed data services in Lynchburg.

While Bell Atlantic offers high speed data services, the results of our market research show that these services are not as fast, nor as cost effective, as customers would like them to be. Bell Atlantic currently has little incentive to accelerate development of higher speed data technologies in Lynchburg, or to offer its services at lower prices. The City can and will explore with Bell Atlantic ways to create such incentives. One clear incentive, however, would be the presence of effective competition in the area.

Response of the City Council and Staff

The City Council has articulated in its Vision Statement its strong view that access to high speed data services and other telecommunications services, at competitive prices, is important for the continued growth and vitality of the community. New businesses that consider locating in the area will demand access to advanced telecommunications. Representatives of Region 2000 report that some of the most frequently asked questions by relocating businesses are:

"Which major long distance carriers have a local point of presence?"

"What is the distance between the long distance carrier's point of presence and the building(s) we might occupy?"

"Do fiber optic lines exist in the City?"

"Is ISDN Service available?"

As businesses become more sophisticated about, and dependent on, advanced telecommunications services, the quality and quantity of offerings in the City will become even more important in attracting and maintaining growth.

In 1997, the City began its fiber optic network project by constructing 10 miles of fiber, to be used primarily to convey Geographic Information System (GIS) data. The project quickly expanded, and with the support of the school system, the City now has built out a network of over 40 miles, connecting over 50 sites. All of the elementary and secondary schools in the Lynchburg system have been wired. The schools have devoted substantial resources to purchasing computer equipment to be used in the classrooms to take advantage of the fiber optic network. The City and the schools hook into the state internet system via the fiber optic network and a connection in the public library.

The City is using the fiber optic network for internet access, system monitoring, transferring and sharing GIS data, and other data uses. The City does not at this time use the network for telephone services.

The schools are using fiber optic network for internet access and to pursue a number of new learning techniques. For example, teachers may construct curriculum using resources available over the internet. They can share resources with other teachers in the system. There also are a number of projects that the school would like to use the fiber optic network to advance that are just not possible at this time. For example, the schools have an outstanding relationship with a number of local businesses[1] The schools partner with local businesses to develop learning units that help train today's students (tomorrow's employees) in necessary skills and techniques for the job market. Communication between the schools and these businesses would be enhanced if the businesses were able to hook into the existing fiber network.

The network passes most major businesses, hospitals, and colleges in the City, and could be expanded to offer these entities a broad range of services, including "dark fiber" (fiber optic cable for high speed data communication without the electronics necessary to "light" the cable and transmit information), "band width" (fiber optic cable for high speed data communication with the electronics necessary to transmit information), "competitive access" (linking a customer's facilities directly to a long distance carrier's local point of presence, thus bypassing

[1] This partnership between the schools and local businesses has been recognized by the Governor as unique in the Commonwealth.

the local exchange), internet services, video services, and traditional telephone services. Recognizing this potential, the City has invested time and financial resources to study the telecommunication needs of the community, to explore ways to develop the existing fiber network to meet these needs, and finally, in this last phase, to explore possible alliances with partners from the industry.

STRATEGIC PARTNER DEVELOPMENT PROCESS

In the spring of 1997, the City Council authorized us to conduct a preliminary assessment of the telecommunications needs of the City, and to describe possible solutions to those needs utilizing the City's existing telecommunications fiber optic network. At the time the Council authorized the study, there was a widely held perception in the City, and among the members of the City Council and government staff, that no real telecommunications competition existed in the City of Lynchburg. There also was a strong perception that competition was necessary to ensure that businesses and residents in the City gain access to high speed data services, choice among multiple services from multiple providers, and to force providers to remain competitive in their pricing for existing and new services.

We conducted a preliminary assessment to determine whether these perceptions were valid. We gathered information by interviewing community representatives, City employees, school personnel and officials, representatives of the health care industry, and representatives of local businesses. Each of these groups verified the need for competition in the telecommunications market in the City of Lynchburg.

At the same time, we conducted an initial legal review and found that, at the time, there were no barriers to the City utilizing its existing fiber optic network in a number of potential ways to encourage competition in the telecommunications marketplace. In fact, the Federal Telecommunications Act adopted only one year earlier encouraged competition in the telecommunications market and prohibited government action, including action at the state or local level, that would operate as a barrier to such competition.

We reported preliminary findings to the City in the summer of 1997. Based on this preliminary assessment, the Council launched its Strategic Partner Development Process in August 1997. At this time, the options for the City to sell capacity on its networking, to lease its network, to sell its network, or even to provide service itself, were wide open. The term "strategic partner" was very broad, and could have meant any one of a large number of relationships.

When the Strategic Partner Development Process was originally launched, the City and its consultants hoped to complete that process by the winter of 1997-98. However, events in the Virginia legislature soon turned all eyes to Richmond. The City determined that it should focus its resources on protecting its position with the legislature during the 1998 legislative session.

The City feared (and appropriately, as it turned out) that Bell Atlantic and other telecommunications providers would support legislation limiting the City's ability to use its network. The Strategic Partner Development Process was put on hold until the conclusion of the session.

Despite the efforts of Lynchburg staff and its allies, the 1998 Virginia legislature adopted amendments to Virginia Code § 15.2-1500 that prohibit localities from establishing "any department, office, board, commission, agency or other governmental division or entity which has authority to offer telecommunications equipment, infrastructure, other than pole attachments or conduit occupancy, or services for sale or lease to any person or entity other than such locality's departments, offices, boards, commissions, agencies or other governmental divisions or entities. . . . provided. . . that any locality may sell any telecommunications infrastructure, including related equipment, which such locality had constructed prior to September 1, 1998 and such locality may receive from the purchaser or purchasers, as full or partial consideration for the sale of such infrastructure, communications services to be used solely for the internal use of the locality."

On its face, this provision appears to prohibit the City from leasing its telecommunications facilities, or offering to sell services or excess capacity on the fiber optic network, to residents or businesses in the community. The City appears to have two primary courses: (1) continuing to use the fiber optic network for its own use and the use of the school systems and other government bodies; and/or (2) selling portions of the system, including related equipment, constructed prior to September 1, 1998 to a telecommunications provider. The City and we will continue to study the nuances of the statute, and may continue to lobby or take other actions to have the statute changed. By its terms, the statute will sunset in mid-2000 unless extended. In the meantime, the City must explore the impact of the statute on its ability to use its telecommunications infrastructure as a method of attracting or providing competition in the area.

The Process Continues

The Strategic Partner Development Process resumed after the close of the 1998 Virginia legislative session. At every stage, the City and its consultants have tried to ensure an open, positive, and inclusive process. Recognizing that the new legislation limited the City's options, the City focused its efforts on finding creative solutions to its desire for competition while still complying with the new law. To that end, City staff and we developed a process designed both (1) to quantify and evaluate the City's perceptions of the need for competition, the market for competition, the economic feasibility of competition, and (2) to begin to engage potential partners in discussions designed to explore a whole range of possible alliances. That process is discussed below.

Surveys and Focus Groups

In the spring of 1998 the City of Lynchburg contracted with Thomas W. Seaman, Ph.D. to plan and conduct a market analysis. Dr. Seaman is the Director of the Center for Community Development at Lynchburg College and a long time resident of the area.

The market analysis involved four distinct steps. First, relying on secondary data, Dr. Seaman gathered and summarized selected demographics of the City and surrounding metropolitan area. Dr. Seaman based his selection of the demographics on the relevance of the data services likely to be of interest to telecommunications potential partners in an expanded system. Second, Dr. Seaman conducted a series of surveys focusing on the telecommunications use, needs, and wants of various sectors of the City's population. The surveyed sectors were businesses, teachers, physicians, health care institutions, and heads of households. The goal was to develop quantitative market indicators. Third, Dr. Seaman conducted a series of focus groups to explore ideas, knowledge, and enthusiasm among representatives from business, education, health care, and households. Fourth, Dr. Seaman and City Staff conducted a number of face-to-face interviews with representatives from local government, business, and educational institutions who are major potential users of an expanded telecommunications system. The purpose of the interviews was to gather information about the needs and wants of the institutions, to give them a personal briefing on the status of the system, and to generate enthusiasm for an expanded system.

Development of Financial Benchmarks and Hypothetical System Design

The City and we also worked with S. Ingram & Associates to develop a hypothetical system design and prepare financial benchmarks to determine whether it is technically and economically feasible to "overbuild" telecommunication services in the City -- in other words, to determine whether a second provider could feasibly offer data, video, and data services in the City of Lynchburg. Such a provider might not necessarily construct a system exactly as S. Ingram & Associates hypothesized, but the hypothetical system is one that can work.

To prepare the financial analysis, S. Ingram & Associates utilized industry averages for costs associated with constructing and operating facilities necessary to offer each of the types of services (in other words, costs associated with equipment for video services, data services, telephony services, security services, etc.). Construction costs were based upon actual costs associated with similar projects and information obtained from industry vendors and contractors. Operating costs were based upon actual costs associated with similar systems. Staffing is based upon industry averages.

On the revenue side, S. Ingram & Associates looked at historical information from other communities where competitors have overbuilt the existing incumbent systems.

Overall, S. Ingram & Associates used estimates of construction and operating costs from the high end of the spectrum, and subscriber penetration and revenue projections at the low end, producing financial projections that are conservative and realistic.

The hypothetical system design takes into account the existing network the City and schools have constructed, and the status of technology available in the marketplace today, given the current and future needs for telecommunication services in the area. The results of this analysis are discussed in later pages of this report, and in the accompanying report from S. Ingram & Associates.

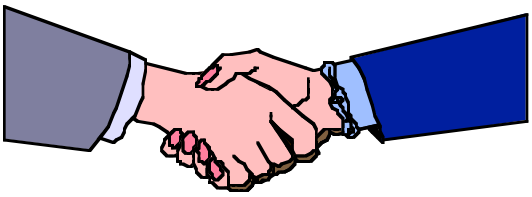
Identification of Potential Strategic Partners

We, with the help of City staff, have been involved in a long and intensive process of locating potential partners. We started that process by reviewing our contacts with telecommunications providers around the country to identify likely candidates to enter into the Lynchburg market and to enter into some type of relationship with the City. We also reviewed and considered the types of providers who already were becoming involved in the Virginia market and markets in the southeastern part of the United States. Together, we developed a list of over thirty potential strategic partners.

Next we developed written materials describing the City of Lynchburg, the existing fiber optic telecommunications network, the goals of the City for its telecommunications network, the state law, and other relevant factors that a potential partner would need to understand before meaningful discussions with the City.

We contacted each of the potential strategic partners by telephone, and, if they expressed any interest, forwarded to them our written information. A copy of the written information that was provided to the potential strategic partners is attached as Appendix B.

Our first round of telephone conversations with the large list of potential strategic partners quickly showed that, while there was at least preliminary interest from a dozen or so providers, many others were not presently interested in entering the Lynchburg market for a variety of reasons. These reasons included the following: (1) Lynchburg is outside their geographic area and outside their area of planned expansion; (2) Lynchburg is not a large enough market area; (3) Given the uncertainties about the effects of the Virginia legislation, and the inherent risks in overbuilding an existing system, Lynchburg does not provide strong enough incentive to enter into competition with Bell Atlantic in this marketplace.



Despite the negative reactions of some potential partners, others were interested and willing not only to review the written materials prepared by the City, but also to travel to Lynchburg to meet one-on-one with City representatives. City staff had several meetings with local potential partners in August 1998. In the week of August 24, 1998, we, the City manager, City staff, a representative of Region 2000, and a representative of the Lynchburg Schools, met with seven potential strategic partners to exchange ideas and information and to explore whether a possibility for cooperation and development exists.

These meetings were extremely valuable for two reasons. First, the meetings helped us to expand our knowledge of the thought processes of potential strategic partners. We now have a better understanding of the providers' approach to the situation in Lynchburg, and have begun to

explore some solutions to the challenges posed by the interplay of the City's goals with the current Virginia law.

Second, we have developed an awareness of the ways in which various industry representatives are approaching development of the telecommunications business in general. Even though some of the methods used by these providers to enter into new marketplaces might not be appropriate or the best fit in the City, we have a much better feel for the possibilities, and the wide range of experiences that each of the different providers brings to the table.

We also had the opportunity for significant positive exchange with representatives from Bell Atlantic, the incumbent telecommunications provider. Bell Atlantic noted from the outset that it has fiber in place in most areas in the City of Lynchburg, and would not benefit significantly from access to the City's fiber optic system. Bell Atlantic expressed interest, however, working constructively with the City. For example, Bell Atlantic's representatives discussed the possibility of accelerating Bell Atlantic's development plans for Lynchburg or conducting pilot programs in the City. Based on our preliminary discussions with Bell Atlantic, one of our recommendations to the City will be that, no matter how the strategic partner selection process proceeds, the City should explore these options with Bell Atlantic. Although a Bell Atlantic pilot program would not bring competition to the area and could be discontinued at Bell Atlantic's discretion, it might still result in the availability of high speed data services that can attract new businesses to the area and provide good opportunities for existing businesses, families, and students.

Cooperation with Region 2000

Lynchburg has been a leader in the region in a wide variety of economic development projects. It helped found Region 2000, the regional economic development agency. It organized other local governments in the region to anticipate and respond to the legislative developments in the Commonwealth in 1998. This spirit of cooperation has continued in the Strategic Partner Development process. The City of Lynchburg has sought and received the involvement of Region 2000 in its contacts with potential partners. Recognizing that the telecommunications market is larger than the City itself, and also recognizing that development of advanced telecommunication services in the City of Lynchburg will help not just the City but the region as a whole, Lynchburg hopes to continue to work hand-in-hand with Region 2000 to attract telecommunications competition to the City and the region.

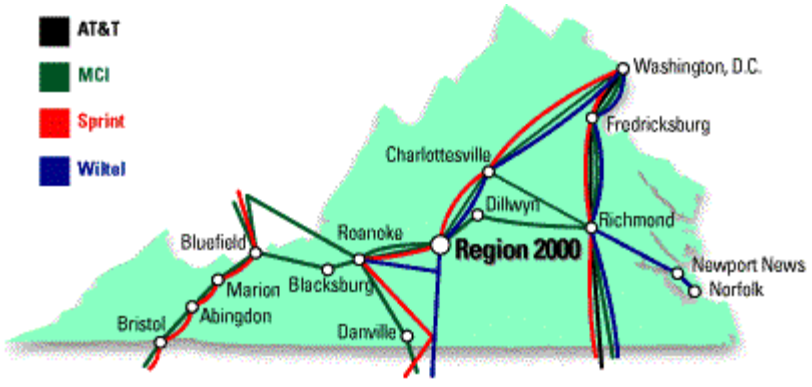
FINDINGS

Possibilities Exist

Based on our study to date, we conclude that there may be one or more strategic partners who potentially can help the City meet its telecommunications goals. Our contacts with potential strategic partners, including our in-depth meetings with representatives of seven potential partners, demonstrate that there is a high initial level of enthusiasm about the prospect

of partnering with the City of Lynchburg. The representatives with whom we met almost uniformly articulated a belief that the City of Lynchburg holds several assets that are extremely valuable to a strategic partner. These assets include:

- The City's vision.
- The City's commitment, demonstrated by its willingness to devote time and financial resources to the project.
- The City's open and inclusive relationship with the industry.
- The City's demonstrated commitment to education, and the commitment of the Lynchburg schools to utilize advanced telecommunications services to educate the City's children.
- The presence of real "champions" of the telecommunications project in the City government and school system.
- The advancement of the City's telecommunications plan, which is miles ahead (both literally and figuratively) of other communities in the region and nation.
- The potential for regional support, embodied by the support and interaction with Region 2000.
- The City's existing fiber optic network.
- The presence of the long haul fiber optic facilities of four telecommunications providers, as shown below:



Several of the potential strategic partners with whom we met suggested approaches that would involve multiple service providers working together to utilize and build out the City's

existing telecommunications network to offer voice, video and data services to residents and businesses in the City. For instance, one provider might offer telephony and data services, another video services, and yet a third internet access. In fact, some of the potential strategic partners with whom we met would not offer services themselves, but instead would be the "quarterbacks," bringing together the different service providers under one umbrella.

As discussed above, other possibilities include developing Lynchburg as a pilot city for Bell Atlantic (or other providers). If the provider is Bell Atlantic, this might not create competition, but it might create many of the benefits of competition.

Some of the potential strategic partners with whom we spoke would be interested in focusing on the City of Lynchburg itself; others would look at the larger region. Some might consider a hybrid fiber coaxial cable build out. Others might use some combination of fiber and wireless services. We are excited that there may not only be one, but many potential solutions to the City's challenges. We think that these solutions are worth exploring further, as discussed in our recommendation section below.

State Law may still be an Obstacle

While we heard a number of interesting proposals regarding potential strategic alliances between the City of Lynchburg and a variety of telecommunication providers, none of those providers has yet suggested a solution that satisfies the City's goals and complies with the existing state law. All of the providers acknowledge that the state law limits the City's flexibility in dealing with telecommunications partners. While everyone hopes that a solution can be found and will work towards finding one, it is not clear at this point that such a result will be possible.

There is a Marketplace

The research conducted by Dr. Seaman shows that there is a demonstrated market for competitive telecommunications services in the City of Lynchburg. Dr. Seaman's market study assumes and the organization of this summary reflects the belief that different sectors of the community have different interest in, knowledge of, and uses for current and future telecommunications. At the same time it should not be overlooked that dividing a community into sectors is to some extent artificial and perhaps misleading. Communities are highly integrated entities — business men and women are also heads-of-households, teachers are also consumers of health care services, physicians are also voters, and so on. To review the details of the market analysis the reader needs to consult the full report.

A Superior Quality of Life

As we have discussed, the City of Lynchburg is the urban center of Central Virginia. Located on the James River approximately 180 southwest of Washington DC, the City has a long history as a transportation and manufacturing center. The City's location made it a railroad hub for both east/west and north/south routes. In the 20th century the long distance telephone lines followed the railroad right-of-ways. These historical processes now have 21st century telecommunications implications. Lynchburg has four points-of-presence (POPS) from major long distance providers unique for a City this size.

Here are some of the key demographic characteristics of the City and region.

- The City is home to approximately 68,000 residents with the entire metropolitan Statistical Area (MSA) containing approximately 210,000.
- There are 27,233 housing units within the City and an additional 56,860 in the MSA.
- The median household income within the City is $23,726.
- The current unemployment rate is 3.1%.
- The service sector employs 26% of the labor force followed by manufacturing at 22%.
- Major private sector employers within the MSA are Ericsson, BXT Technologies, J Crew Outfitters, RR Donnelley and Sons, Griffin Pipe, Rubatex, Ross Products, Lane Furniture, Framatome Technologies, First Colony Life Insurance, GE Capitol.
- Median sales price for an executive quality, 2,200 sq. ft . house is $136,527.
- Publications like Money routinely rank Lynchburg among the most desirable places to live in the south.

Excellent City Government

Lynchburg is an independent city with a council-manager form of government. The mayor is elected by the full council. In a recently adopted vision statement for the 21st century,

the City leaders have pledged themselves to provide "a comprehensive communication infrastructure for linking community institutions, including schools, colleges, hospitals, businesses and government agencies, and households into one powerful network." The City and its leaders are clearly taking a proactive approach to making the vision a reality and leading the way within the region.

The surrounding counties — Amherst, Campbell, Bedford, and Appomattox — have boards of supervisors which elect a chair and usually employ a county administrator. The leadership within the counties are being kept informed on the progress of the City's telecommunications system and are informally expressing interest.

An Expanding Business Sector

The Greater Lynchburg Chamber of Commerce membership includes nearly 1,000 companies ranging dramatically in size and type of business. While the service sector accounts for 26% of the labor force, 22% are employed in manufacturing. Manufacturing ranges from traditional "smoke stack" industries like Griffin Pipe to high tech companies like Framatome Technologies. The economic structure of the City and region is diversified and strong. A recent survey of human resource officers described the labor force as exhibiting an extremely high work ethic and commitment to traditional values.

The market analysis survey mailed questionnaires to a randomly selected sample of 200 small to medium companies within the City. Sixty-four questionnaires were returned for a response rate of 32%. In addition to the survey, the business market was observed with focus groups and one-on-one interviews with major potential users of a telecommunications system. The following data were derived from those sources.

- 81% of businesses currently have Internet access; it is expected to grow to 98% within 2-5 years.
- 30% of businesses currently use on-line banking; it is expected to grow to 43% within 2-5 years.
- 72% of businesses currently have 800 phone service; it is expected to decline to 68% within 2-5 years.

- 61 % of businesses currently have Web sites; it is expected to grow to 64% within 2-5 years.

- 65% of businesses currently use electronic data transfer; it is expected to grow to 69% within 2-5 years.

- 20% of businesses currently use videoconferencing; it is expected to grow to 39% within 2-5 years.

- 43% of businesses currently use remote access computing; it is expected to grow to 46% within 2-5 years.

- When asked about level of satisfaction with the quality of current telecommunications services, no service was singled out for significant dissatisfaction although paging, cellular phone, and Internet services were rated lower than others.

- When asked about level of satisfaction with the cost of current telecommunications services, there was much less satisfaction toward all types of services.

- When asked if they would consider changing to another service provider supplying comparable service at less cost, the response was a clear "Yes" — the greater the reduction, the greater willingness to consider change.

- AT&T has the lion's share of the long distance phone business with 51 %, the others share the remaining 49%.

- When asked if they would consider switching to new telecommunications service providers fewer than 25% said "no." The others said clearly "yes" or a more conservative "don't know."

- When asked what criteria were most important in telecommunications services, quality and reliability of service ranked highest. While important, the technical and cost criteria ranked as less important.

- In the average company surveyed, 22% of employees have computers at their workstations. In the next 2-5 years this is expected to reach 38% of employees.

- Focus groups and interview discussions revealed:

  Significant enthusiasm for an expanded Central Virginia telecommunications system.

An openness to consider nontraditional sources of services.

Enthusiasm over the possibility of competition in areas where it does not now exist.

- **Conclusion** — Lynchburg's businesses are moving ahead in the uses of telecommunications but there is room for substantial expansion and the companies expect to expand.

Rich in Educational Institutions

Lynchburg is a city rich in outstanding educational institutions at every level — K-12, two and four year colleges, and graduate programs. The public schools include twelve elementary schools, three middle schools, two comprehensive high schools, and an assortment of special schools and programs for selected groups of students. The public schools employ nearly 750 classroom teachers. This system which serves 9,500 students is regularly ranked among the best in the state and nation. The public school system is currently served by the City's fiber optics system.

During the summer of 1998 an interview with public school officials was held to discuss current and future uses of the emerging telecommunications system. The interview revealed that the public schools are already major users of the new fiber optics system and anticipate greater use in the future. The school system has more that 1,700 networked computers located in classrooms, laboratories, and offices. The Internet is rapidly becoming an integral part of the teaching/learning process. One of the middle schools currently has the capability to engage in real-time electronic field trips around the world. The fiber optics system will allow this experience to be easily and inexpensively made available to all schools.

Expanded uses in the near future include but are not limited to individual school web sites that will include a wide array of information and materials and distance learning between schools to allow small enrollment classes to be offered in different schools at the same time.

The school officials also see expanded applications once the system links homes, businesses, and colleges. Links with homes will allow much greater contact and interaction between the teacher and parents. The parents will have an opportunity to become full partners along with student and teacher in the educational/learning process. Links to area colleges will allow advanced students to actually enroll in college classes without leaving the high school. The system will also allow the public schools to use the expertise of college faculty for the introduction of units of study in all subjects, i.e. a professor who is expert on the civil war could easily introduce the subject to middle school students without leaving the college campus. Links to area businesses promise to greatly enhance the interaction between business and school allowing for new learning opportunities, work place education, and career development.

In addition to the public system, K-12 students are served at two parochial schools. Two residential middle/senior high schools are also located within the City and serve students from the City as well as across the state and nation — for the Arts. None of these schools are currently served by the fiber optics system and all are potential users.

The higher education community within the City of Lynchburg includes Central Virginia Community College, Lynchburg College, Randolph Macon Women's College, Liberty University, Virginia University of Lynchburg, and Sweet Briar to the north in Amherst County. In addition, a number of colleges and universities located elsewhere offer courses within Lynchburg including the University of Virginia, Old Dominion University, and Averett College.

As would be expected, the higher education community is currently a major user of telecommunications technology and their utilization is expected to increase dramatically in the years ahead. None of these institutions are served by the City's telecommunications system requiring each to seek and maintain their own arrangements.

Interviews to explore interest in and future uses of an expanded telecommunications system were held with a sample of these major potential educational users. The interview with Lynchburg College officials revealed that institution has invested major resources in telecommunications. The institution houses approximately 1,500 computers all networked and with Internet connection. Distance learning opportunities with other colleges are in the discussion stages and would be enhanced with a link to the City's fiber optics system. Such a link would also allow Lynchburg College faculty to be in real-time contact with student teachers in the public school system and allow data transfer between faculty doing research for the schools and/or City.

One of the unique features about the dissemination of telecommunications information and applications is that it often involves children teaching adults rather than the more traditional path of adults to children. It is the child who comes home from school and shares new telecommunications experiences and makes requests for computers, E-mail, getting on the web, etc. The public school teacher is a vital player in creating this interest in telecommunications in children and promoting the expansion of telecommunications.

To measure the knowledge and use of telecommunications among the City of Lynchburg public school teachers and their enthusiasm for modern telecommunications, a survey of teachers was conducted in the summer of 1998. A questionnaire was distributed through the schools to all

of the approximately 750 teachers. Participation in the survey was, of course, voluntary and produced 416 responses — a return rate of over 55%. The responses proportionately represent K-12 teachers, all subjects, and all levels of teaching experience. Below is a summary of the results of that survey.

- 94.5% of the teachers were aware of the construction of the fiber optics telecommunications system.
- 94% indicated that they will make use of a networked system that connects homes, school, government offices, the Web, etc.
- 95% reported that they already have classroom access to a personal computer. (The remaining 5% are teachers without permanent classrooms such as art teachers).
- 96.4% reported that they already make use of the personal computer as a teaching aid or to prepare for class.
- 91% indicated that their classroom PC was connected to the Internet.
- 84% reported that they have access to a PC in their home.
- 77.5% of those with home computers have a modem.
- 64% reported subscribing to an Internet service.
- America On Line was by far the most popular Internet provider among teachers with 64% of the market. The remaining 36% were divided over at least six other providers.
- 30% answered "Yes" when asked if they would be willing to participate in focus groups and/or serve on local committees related to telecommunications. (The names are available).

The teachers were asked to anticipate and list the educational advantages of an expanded telecommunications system that reaches into homes and linked them with the classroom. The most frequent responses were:

- easier, quicker, and more frequent communication between teacher and parent
- homework and project assignments could be made on-line
- greater access to the Internet for student projects and research
- teachers could communicate and share ideas more easily

The above assessment of the Lynchburg educational community reveals widespread interest in, use of, and enthusiasm for modern telecommunications. Decision makers in both the public and private educational arenas have committed many millions of dollars to bring to and keep area education at the frontier of educational telecommunications. The teacher survey clearly indicates that this involvement and enthusiasm is not limited to a small number of teachers or administrators but is pervasive throughout the educational community. With this level of commitment, involvement, and enthusiasm telecommunications has a bright future in the City of Lynchburg.

Excellent Health Care

The quality and breadth of health care within Lynchburg and its MSA are ranked among the best in the State. One often cited reason is that physicians are attracted by the quality of life within the region and once here choose to stay. The hub of the health care industry is Centra Health, a nonprofit, locally owned and managed corporation. Centra Health has become one of the major employers within the region and, as might be expected, one of the largest potential users of an expanded telecommunications system.

To assess health care telecommunications uses, needs, and wants questionnaires were mailed to a sample of 155 physicians (59 were returned for a response rate of 38%) and 13 nursing homes (7 were returned for a response rate of 54%). Centra Health was not included in the survey. In addition, a health care focus group was held. The following data were derived from those sources.

- Health care professionals are currently light to moderate users of available telecommunications but expect to significantly increase use in the next 2-5 years.
- As part of a growth industry, health care professionals expect the number of their phone lines — land and cellular — to increase in the next 2-5 years.
- When asked about the quality of current telecommunications services paging, cellular, and Internet service got the lowest ratings.
- When asked about the cost of current telecommunications services there was a general expression of moderate dissatisfaction.
- When asked if they would consider changing to another service provider supplying comparable service at less cost, the response was a clear "Yes" — the greater the reduction, the greater willingness to consider change.
- AT&T again claims the bulk of the long distance business with more than 50%.
- When asked if they would consider switching to alternative telecommunications providers, only a small percentage answered no.
- When asked about interest in additional providers of services, very high level of interest was expressed.
- As was the case in the business sector, quality and reliability of service are the most important criteria when evaluating telecommunication providers.

- Focus group participants indicated that physicians and other health care professionals were not as informed about or using state-of-the-art telecommunications as the public might think. For physicians, like the rest of us, change is difficult.

- Focus group discussion of questionnaire comments suggest significant enthusiasm for and a willingness to participate in an expanded telecommunications system.

Enthusiastic Residents

There are more than 27,000 families within the City and another 57,000 in the MSA — a sizeable market for services if heads-of-households are ready, willing, and able to purchase telecommunications services. To assess the household market a random sample of 2,000 utility customers within the City was selected and surveyed. Six hundred questionnaires were returned for a response rate of 30% — a remarkably high return rate for a cross-sectional sample of a general population. This high rate of return coupled with questionnaire comments and focus group discussion can be interpreted as an expression of strong interest and support for an expanded telecommunications system. More than 100 families volunteered to serve on focus groups or committees.

The highlights below were derived from survey and focus group data:

- 88% of households currently subscribe to the cable TV service.

- 50% of households have internet service and the number is expected to reach 62% within 2-5 years.

- 56% of households currently subscribe to a cellular phone service.

- Only 14% of households currently use on-line banking but 31 % expect to within 2-5 years.

- Only 11% of households currently use alarm or security monitors but 25% expect to within 2-5 years.

- When asked about satisfaction with the quality of services, heads-of-households expressed the greatest dissatisfaction with cable TV followed by internet service.

- When asked about satisfaction with the cost of services, heads-of-households expressed a general dissatisfaction with cable TV leading the list.

- When asked if they would consider changing to another service provider supplying comparable service at less cost, the response was a clear "Yes" — the greater the reduction, the greater willingness to consider change.

- AT&T claims over 60% of the household long distance service.

- When asked if they would consider switching to nontraditional service providers 91% said "Yes" to cable service, 71% said "Yes" to local phone service, and 82% said "Yes" to internet service.

- As was the case in all other sectors of the City, quality and reliability were ranked as the most important characteristic of telecommunications services — technical and cost issues are less important.

- Of all the focus groups held, the heads-of-households expressed the greatest enthusiasm.

There was every indication that when it comes to home applications of telecommunications, Lynchburg's homes are ready and willing to switch.

Perhaps because of the strength of the educational sector, perhaps because of the concentration of manufacturing companies (many who do business internationally), or perhaps because of forward looking and innovative government leadership, the City of Lynchburg is a community that knows what it wants in telecommunications as it enters the new century. The City leadership in government and education with the support of all sectors of the community has assumed a proactive stance toward the City's telecommunications future.

The City and region are strong educationally, economically, and in health care and offer a quality of life difficult to match anywhere in the nation. Already out in front of most similar communities in telecommunications, the City has a market that wants and will support more. The potential to tap into this market should be very attractive to telecommunications competitors.

A Hypothetical System Exists that Works Technically and Financially

It is also clear, from the research of S. Ingram & Associates, the financial and engineering consultants working on this project, that a telecommunications system can be built and operated in a way that satisfies the City's goals and is also economically feasible. S. Ingram & Associates have analyzed several communication technologies that could be implemented in the City to expand the existing fiber optic network to residents and businesses. There are descriptions of each of these technologies in S. Ingram & Associates Report (which is attached as Appendix A). Each technology description includes a general description of the technology and an assessment of the possible advantages and disadvantages of each. S. Ingram & Associates concludes that a

hybrid fiber optic design coaxial cable (HFC) most realistically meets the City's goal of fiber to every home and business, given the current cost of technology.

What is HFC?

A hybrid system benefits from the strengths of both fiber optic and coaxial cable. The system consists of a headend, fiber optic backbone network, and coaxial cable from the fiber network to the users. The combined signals in the headend are converted into light and injected onto the fiber optic cable. The fiber connects to the cable at **a node**.

At a node, a device converts the signal on the light beam to the RF frequency spectrum. The node typically supplies a service area of between 200 and 1,000 homes. The coaxial cables extending from the node require fewer amplifiers than the typical coaxial system because the coaxial radials are shorter in a hybrid system. With fewer amplifiers, the coaxial transmission frequency bandwidth can be increased allowing greater upstream (return) signal capacity. When a subscriber transmits a signal, it travels through the coaxial cable to the node where it is imposed on to an optical beam and transmitted through fiber optic cable to the cable headend.

Different configurations can be used in designing a hybrid system. These configurations include fiber spokes radiating from the headend to each node where coaxial distribution cable extends from the node. The radiating spoke (daisy chain)design is the lowest initial cost configuration. However, the radiating spoke configuration lacks redundancy. This causes particular concern where reliability is important, for example, with health care users.

The backbone ring (loop) configuration provides greater reliability because it is designed with more than one path for the signal to flow. The backbone ring configuration enables the signal to be rerouted should a component failure occur on the fiber optic ring. This backbone ring can also feed smaller fiber rings that feed area nodes. Coaxial spokes extend from the nodes to the subscribers.

Most companies building HFC systems are designing the systems with few amplifiers. Nodes serve 500 subscribers or less. Unused (dark) fiber is included to have the spare capacity in the event additional nodes are needed in the future. The key to designing the communications system is to plan for the anticipated usage of the return path and for future uses that may not be known today.

This design strategy decreases the length of the coaxial cable and thus reduces possible signal distortion. The fiber optic cable provides a stronger signal to the coaxial cable connection points than would be possible using the typical coaxial cable system technology. The hybrid system has a greater capacity than the coaxial system but easily interfaces with the existing subscriber equipment. Coaxial cable is limited in its capability or must be duplicated in areas where greater capacity is needed. The fiber optic portion of the HFC system provides the needed increase in capacity at a lower cost per channel.

Table 1 shows the advantages and disadvantages of each of the technologies discussed in S. Ingram & Associate's Report. A comparison readily shows that the ***hybrid fiber optic coaxial*** technology in a backbone ring configuration is best suited for deployment in distribution systems in which a variety of interactive telecommunications services are anticipated.

Table 1
Technology Comparison

Technology	Advantages	Disadvantages
Coaxial Cable	Efficient and Low Cost	Amplification required due to signal attenuation over distance. The higher the frequency the greater the attenuation requiring more frequent amplification. System noise is also amplified. Return path limited to 5 MHz to 40 MHz. Lack of path redundancy.
Fiber Optic Cable	Increased capacity; low attenuation over long distances; not affected by EMF or RF interference.	Higher cost of deployment; light signal must be converted to a usable signal (RF) at some point. No Home Interface Unit available for FTTH deployment.
Hybrid Fiber Coax (HFC)	Combines the strengths of coax and fiber optics; increased overall system return path capacity and path redundancy.	Slightly higher cost of deployment; the coax leg is still limited in return capacity.
Direct Broadcast Satellite (DBS)	High quality digital signals; ability to provide more video services.	Line of sight technology requires no obstructions in path; cost of equipment purchase and maintenance; return path (if any) is by phone line; no local broadcast stations.
Wireless Cable (MMDS)	Low cost of deployment (no physical plant to construct); quality digital signals.	Line of sight transmission; limited availability of channel licenses; one way with possible phone line return; signals affected by outside interference.
Local Multipoint Dist. Service (LMDS)	Low cost of deployment (no physical plant to construct); quality digital signals. Cellular technology with enormous amount of spectrum.	Licenses auctioned by FCC at a high cost, in most areas; signals affected by weather, physical obstructions, and signals from overlapping adjacent cells. Uncertainty of availability and cost of equipment.

Hypothetical Network - Conceptual Design

S. Ingram & Associates' Report also diagrams a hypothetical communications system that could be developed to serve the existing and future communications needs of the City.

To develop the hypothetical system, S. Ingram & Associates:

- Reviewed the needs assessment to determine the capacity and operational specifications required for the services proposed to fulfill the identified needs.

- Reviewed commercial and residential areas to determine the average number of homes per node and the number of nodes required.

- Developed reliability criteria commensurate with the needs of the communications system.

- Developed unit costs for each component of the system.

- Calculated initial equipment costs, labor costs, and annual operating costs for the hypothetical system.

The communications network needs require a level of reliability that exceeds the reliability typically accepted for cable television systems. Typically a cable television system is a radial system. When a failure occurs on a radial system the service beyond the failure is interrupted. Services such as voice and data for commercial and City users must be more reliable than cable television service.

Telephone networks are typically designed for greater reliability by using alternative paths for the signal in case a component of the system fails. For smaller geographic areas a loop or ring architecture can be used to provide greater reliability for critical voice and data services. If a component on the ring fails, the signal can be routed through the part of the ring that remains in service. Based on our review of the communications needs, the reliability criteria used was that the network should be a ring architecture utilizing alternate path redundancy features to provide the reliability required. This architecture would then be expanded into a hybrid fiber optic/coaxial (HFC) system as follows.

Today, the HFC architecture is more frequently cited as the key transport media in the delivery of voice, video, data, and multimedia services to consumers. The HFC network offers an advantage from its initial implementation. ***HFC provides a scalable and migratory path that can deliver greater bandwidth capacity with lower capital investment than other technologies***. Since HFC can also deliver digital signals in any type of modulation format, the architecture provides broadband operators with the ability to migrate to the all-digital transport network in the future. This fact has been instrumental in convincing telephone companies that the HFC platform is the architecture they will utilize for future deployment of services.

This state-of-the-art HFC system would be designed at 750 MHz and have the capacity to deliver over 80 analog video channels in the 50 MHz to 550 MHz frequency range. The additional 200 MHz will be reserved for digital services. Non-active components, including broadband taps, splitters, and connectors will have a bandpass of 1 GHz. The return signal path of the coaxial portion of the system will utilize the 5 to 40 MHz frequency spectrum.

The headend and operational control center (HUB) will utilize a fiber optic backbone to transport signals to ***Optical Transfer Nodes (OTN's)***. These OTN's will feed secondary fiber

rings strategically designed to distribute the signals to geographic areas throughout the City. For the HFC network to be fully positioned for interactive capabilities, the size of the areas served by fiber remains a critical factor. Interactive services such as broadband telephony and data communications rapidly use up the return path.

Fiber optic cable will extend from each OTN to provide signal to ***Opto-Electric Nodes*** (Neighborhood Nodes). Each OTN will serve several neighborhood nodes. This node is a device that converts the signal on the light beam to a usable RF signal. These nodes will serve between 250 and 750 addresses, depending upon anticipated return requirements during the technical design phase of the project. Node size will normally average approximately 500 addresses.

Technological advances now allow approximately 70 percent simultaneous usage of the return spectrum when nodes serve 500 addresses or less. From these nodes, coaxial cable will carry the signal to and from the consumer. The coaxial cables extending from the nodes require fewer amplifiers and active devices than the typical coaxial system because the coaxial radials are shorter. This design strategy of decreasing the length of the coaxial radials reduces distortion. The fiber optic cable provides a stronger and cleaner signal to the coaxial connection points than would be possible using the typical coaxial distribution system. The hybrid system has far greater capacity than the coaxial system but easily interfaces with existing subscriber equipment.

A pure fiber optic distribution system would provide greater delivery capacity but the ability to interface with the subscriber is virtually nonexistent, at this time. Extensive research has shown that the development of a fiber optic home interface unit was halted when major telephone companies selected HFC as the architecture of choice for future development of services. The construction cost of fiber distribution to the home, at this time, would also increase the cost of the project by a factor of 35 to 50 percent, not considering the cost of a home interface unit. The technical design of the system will provide the capability to extend the fiber deeper into the system or possibly to the home when those options become both technically and economically feasible.

The costs of constructing and operating this hypothetical hybrid fiber optic/coaxial cable network are discussed in the S. Ingram & Associates Report.

Economic Analysis

S. Ingram & Associates also has proposed an economic feasibility analysis of operating the hypothetical system. This discussion summarizes that study.

Revenues were projected based upon entering the marketplace with a competitive rate structure which would reduce the cost of service for an ***average subscriber*** while maintaining the ability to provide adequate revenue to cover annual debt service, operational expenses, and provide a reasonable amount of cash reserve. The rates were structured using the rates presently

being charged for comparable services and reducing those charges and fees which could be reduced.

Operating expenses were estimated based on an understanding of the cable TV, telephone and computer related service industries.

Revenues and expenses were projected over a twenty year study period. Twenty years is the expected life of the communications infrastructure. The actual life of the system would be dependent on maintenance and the ability of the system to adapt to technological changes in the future. The model assumes that the fiber lasts 20 + years. Other equipment will be regularly replaced and upgraded every 3-5 years.

Economic parameters were developed to model a base scenario that could be reasonably be expected to occur. These parameters were based on the assumption that structuring rates at a competitive level in the marketplace would result in a commensurate subscriber penetration level. This level was modeled to reflect the rate structures to be implemented according to those circumstances previously listed. The parameters included in the economic analysis are described in the following paragraphs.

Cable television subscriber penetration was estimated at 37.5%[2] of the potential subscribers or addresses passed by the communication system. We assumed this penetration level could be achieved by the end of the second year from the start of construction. We have included expenses for an aggressive marketing campaign to gain market quickly. This level of penetration would be approximately 7,968 Basic Cable subscribers by the end of year two.

Data communications subscriber levels were estimated at 15% of all homes and 15% of all businesses in the City service area. This level is conservative; however, there is little history to base our projections on and few services available today to compare to. The 15% level would equate to approximately 2,927 residential subscribers and the 15% would equate to approximately 261 commercial subscribers.

The system could provide alternate access services to commercial and industrial customers requiring high-speed data services such as ***private line and special access*** services. In addition, those users may request alternate access provision of long distance voice communications. The projected revenues for this service are a conservative estimate of the anticipated market.

[2] Adelphia, the incumbent cable television operator, has a penetration rate of over 75%. S. Ingram & Associates' research reveals that cable overbuilders associated with municipalities typically take over one half of the incumbent's subscribers. Therefore, S. Ingram & Associates uses a 37.5% penetration rate assumption in its projections.

Certain economic parameters must be assumed when conducting an economic analysis. The key economic parameters are as follows:

· Finance Rate	8%
· Amortization Period	20 Years
· Escalation Rates	Operations/Maintenance/Marketing Exp. - 3.5%/Yr.
· Interest Income	Construction/Operations Expense Funds - 5%
· Local Taxes	6%
· Operations Expense Fund	Funds borrowed to cover initial operating expenses

The economic analysis was shown on a phased basis. Expenses relative to the provision of those services were applied as required. Additional services and communications functions should be analyzed at the time the decision is made to add those services and functions. A financial business analysis should be prepared to determine the overall affect each would have upon the success of the project. LEC (Local Exchange Carrier) service should be considered by the end of the third year of operations. A financial analysis is included which shows that this would be a viable service to add when considering today's parameters; however, technological advances could bring forth drastic changes in the cost of delivery by the time the service is to be added, making it an even more feasible addition to the project.

The financial analysis includes revenue and expense projections to operate the cable television and data service over the distribution network. Initial capital requirements were funded with at an 8 percent interest rate over 20 years. S. Ingram & Associates estimates the initial capital requirements to complete the project to be $32,000,000. Over the 20 year life of the project, S. Ingram & Associates estimates earnings before taxes of $17,232,130 from data and internet services. The source and use of funds are included in Table 4 in S. Ingram & Associates' Report, which also is included below. Earnings projections are attached as Exhibits to S. Ingram & Associates' Report.

Table 4
Source and Use of Funds

Cash Sources	
Loan Proceeds	$32,000,000
Total Cash Sources	$32,000,000
Uses Of Cash	
Construction Fund	$ 26,139,509
Capitalized O & M Fund	$ 100,491
Capitalized Interest	$ 5,120,000
Issuance Cost (2%)	$ 640,000
Total Uses of Funds	**$32,000,000**

From this economic analyses, it appears that revenues derived from the provision of these ***value-added services*** provide more than adequate funding to support the operations, maintenance, and debt service of the system over the entire study period.

The revenue and expenses for the provision of LEC service was not included in the primary economic analysis. A separate financial analysis was performed (See S. Ingram & Associates' Report Exhibit II) to determine the economic feasibility of providing this system utilizing the financial parameters which exist in today's marketplace. The capital requirement to add broadband telephony to the system as a ***value-added service*** would be $4,600,000. Projected earnings before taxes over the life of the project total $1,632,127 for these services. Based upon this analysis, LEC service would be a feasible addition to the system; however, an additional analysis should be performed **prior** the implementing the service.

S. Ingram & Associates also analyzed the economics of adding security (alarm monitoring) services (See S. Ingram & Associates' Report Exhibit III). Although there is little history to verify the projected percentages of persons and businesses subscribing to the service, the general demographics of the BED would seem to indicate that the factors used in the study are reasonable. The rates used in the study are comparable to those charged by other such service providers. The capital requirement to add security to the system as a ***value-added service*** would be $3,400,000. Potential earnings before taxes over the life of the project are $2,895,980.

Detailed financial models of the economics of an expanded, competitive telecommunications system are included in S. Ingram & Associate's Report.

Where shall we go from here?

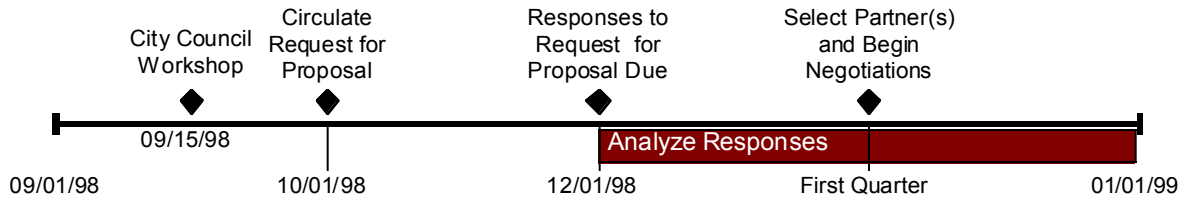
Based on the interest and enthusiasm of potential strategic partners, the market research done by Dr. Seaman, which demonstrates a marketplace for competitive telecommunications services, and the modeling done by S. Ingram & Associates, which demonstrates that there is a hypothetical system that can satisfy the economic and technical requirements of such a partnership, we believe the City Council should find that there is sufficient potential for developing a new strategic partnership or alliance between the City of Lynchburg and private telecommunications operators to justify taking the next step.

RECOMMENDATIONS

We recommend that the City proceed with its Strategic Partner Development Process by preparing and publishing an invitation to providers to respond in a formal way with detailed proposals to help the City achieve its goals. Those goals include, but are not limited to, the development of competition, acceleration of economic development, advancement of education and health care, support for families, and enhancement of quality of life. Many providers with whom we met showed initial enthusiasm for finding these types of solutions. We recommend that the invitation require these providers to present their solutions in writing, to give the City the best basis for fair comparison.

We recommend that the invitation be finalized and circulated no later than October 1, 1998. Responses would be due no later than December 1, 1998. The City would review the responsive proposals as promptly as possible to compare them and explore any ambiguities, and to determine whether, in fact, the City has realistic prospects of entering into one or more strategic partnerships to meet its telecommunications goals. If the answer is Yes, the City would choose in the first quarter of 1999 the partner or partners with whom to engage in detailed negotiations.

Time Line



We also recommend that the City continue discussions with Bell Atlantic to determine whether the City can provide incentives that motivate Bell Atlantic to accelerate its development plans, or even treat Lynchburg as a pilot program, for new services.

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